Patent Claims

Carrier For Structural Parts And Method For Producing Same

1. A carrier (10, 38, 100) for structural parts to be subjected to a heat-treatment process, comprising at least one frame (11, 40, 102, 104, 106, 108, 110) and a lattice (20, 50, 112, 114, 116, 118, 120) consisting of intersecting strands proceeding therefrom, wherein the frame comprises one or more limbs (12, 14, 16, 18, 42, 44, 46, 48, 121, 122, 124, 125, 126, 128, 130, 132, 134, 136, 138, 140) preferably forming a polygon, and wherein the frame (11, 40, 102, 104, 106, 108, 100) comprises temperature-resistant material and the strands of carbon fibers or ceramic fibers which form the lattice (20, 50, 112, 1414, 116, 118, 120) extending from the limb or pieces (12, 14, 18, 42, 44, 46, 48, 121, 122, 124, 125, 126, 128, 130, 132, 134, 136, 138, 140) of the frame, characterized in that
the lattice (20 50) is formed by a section of an endless fiber bundle extending between limbs (12, 14, 16, 18, 42, 44, 46, 48) of the frame in the form of single-layer or multilayer fiber strands or intertwined yarns of a carbon-reinforced carbon material and/or ceramic material, the fiber bundle extending in a warp and woof-like woven structure between the limbs of the frame.

2. The carrier according to claim 1,
characterized in that
the limbs (12, 14, 16, 18, 42 44, 46, 48) of the frame extend at a right angle to the plane formed by the lattice (20, 50).

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3. The carrier according to claim 2,
characterized in that
the carrier (100) comprises several frames (102, 104, 106, 108, 100) forming a three-dimensional body and, in particular, has a basket geometry.

4. The carrier according to at least claim 1,
characterized in that
the limbs (12, 14, 16, 18) have recesses in their respective longitudinal edges, sections of the fiber bundle passing through said recesses to mount the lattice (20, 50).

5. The carrier according to claim 4,
characterized in that
the recesses form a ridge-like geometry in the respective longitudinal edge (24, 26, 28, 30) of the limb (12, 14, 16, 18) of the frame.

6. The carrier according to at least claim 1,
characterized in that
the limbs (42, 44, 46, 48) of the frame (40) have openings such as bores (52, 54) through which the fiber bundle passes.

7. The carrier according to at least claim 1,
characterized in that
the fiber bundle laid in the woven structure extends under prestress between the limbs (12, 14, 16, 18, 42, 44, 46, 48).

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8. The carrier according to at least claim 1, characterized in that the frame (11, 52) is integrally cut out of a carbon fiber-reinforced carbon plate.

9. The carrier according to at least claim 1, characterized in that the limbs (42, 44, 46, 48) forming the frame (40) are joined together by means of plug connections.

10. The carrier according to at least claim 1, characterized in that the base of the frame (11, 38) or its limbs (12, 14, 16, 18, 42, 44, 46, 48) is a pyrolyzed fiber preform produced by means of TFP technology.

11. The carrier according to at least claim 1, characterized in that the frame (11, 40) comprises a section or sections separated, in particular, by means of water jet cutting from a carbon fiber-reinforced carbon plate, such as a CFC plate.

12. The carrier according to at least claim 1, characterized in that the fiber material comprises or contains Al_2O_3 and/or SiC and/or BN and/or C.

13. The carrier according to at least claim 1, characterized in that the lattice (20, 50) has a matrix which comprises or contains carbon, B_4C, Al_2O_3, SiC, Si_3N_4 and/or mullite.

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14. The carrier according to claim 13,
characterized in that
the matrix is separated from the gas phase and/or formed by pyrolysis of a precursor material.

15. The carrier according to claim 14,
characterized in that
the precursor material is phenolic resin and/or furan resin and/or a Si precursor.

16. The carrier according to at least claim 1,
characterized in that at least the lattice has or contains a coating of oxides, nitrides and/or carbides of the third and fourth main group and/or third to sixth subgroup of the periodic system and/or carbon.

17. The carrier according to at least claim 1,
characterized in that the frame (11, 40) comprises carbon fiber-reinforced carbon, fiber ceramic or graphite.

18. The carrier according to at least claim 1,
characterized in that
the carrier (100) has a parallelepiped geometry open on one side with bottom and side frames (102, 104, 106, 108, 110) which are each holders for a lattice (112, 114, 116, 118, 120).

19. The carrier according to at least claim 18,
characterized in that
the upper limb (121, 122, 124, 125) of each side frame (112, 114, 116, 118) is a flat element and/or the lower

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limb (126, 128, 130, 132) of each side frame is an angular element and/or limbs (134, 136, 138, 140) at a right angle thereto are each a round element.

20. The carrier according to at least claim 19, characterized in that the flat element forms, with its flat side, a plane in which or in approximately which the lattice (112, 114, 116, 118) fixed by the frame (102, 104, 106, 108) extends.

21. The carrier according to at least claim 19, characterized in that the respective flat element (121, 122, 124, 125) of the side frame (112, 114, 116, 118) passes over in a flush manner into the respective front end of a round element (134, 136, 138, 140) on the outer longitudinal peripheral side.

22. The carrier according to at least claim 19, characterized in that adjoining flat elements of rectangular or approximately rectangular abutting frames (102, 104, 106, 108) are connected via a plug connection which, in turn, extends within one of the round elements (134, 136, 138, 140).

23. A method for producing a structural part consisting of intersecting strands of carbon fibers or ceramic fibers using a frame composed of one or more limbs, from which an endless fiber bundle in the form of single-layer or multilayer fiber strands or intertwined yarns are mounted accordingly as the strands to form a desired lattice structure, that a matrix is then inserted into the fibers

and the lattice subsequently removed from the frame.

24. The method according to claim 23,
characterized in that
the lattice is separated, e.g. cut off, from its sections extending from the frame.

25. The method according to claim 23,
characterized in that
the matrix is separated from the gas phase and/or formed by pyrolysis of one or more precursor materials.

26. The method according to claim 23,
characterized in that the lattice is coated on the surface prior to and/or after removal of the lattice from the frame.

27. The method according to at least claim 23,
characterized in that
Al_2O_3 and/or SiC and/or BN and/or C is used as fibers or fiber material.

28. The method according to at least claim 23,
characterized in that
carbon and/or B_4C and/or Al_2O_3 and/or SiC and/or Si_3N_4 and/or mullite is used as matrix material.

29. The method according to at least claim 26,
characterized in that
the lattice is surface-coated with oxides, nitrides and/or carbides of the third and fourth main group and/or third to sixth subgroup of the periodic system and/or carbon.

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30. A lattice or method for producing a lattice according to any one of the claims 1 to 39.

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